Obstetrical Care

TRAINING GUIDE

# Avalon Fetal Monitor
## FM20 / FM30

FETAL MONITORING

PHILIPS

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Printed in Germany 03/07

Part Number M2703-9421A
4512 610 20691

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# Introducing the Avalon FM20 / FM30

This Training Evaluation for the the Avalon FM20 / FM30 Fetal Monitor is broadly divided into two parts. In the first part, Chapter 1 provides introductory information about the monitor and transducers, and Chapter 2 states the performance objectives for the training.

In the second part, appendix A consists of fetal monitoring lab exercises, and in appendix B you can find the answers to the lab exercises. Photocopy appendix A as many times as necessary for your department, so that you can preserve the original, or print it from the PDF file on the Fetal Monitoring Documentation DVD[1].

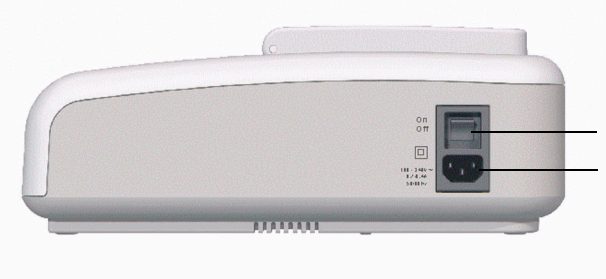
## Overview Monitor

Overview

| | |
|---|---|
| 1 | Touchscreen display (tilt and fold) |
| 2 | Power LED |
| 3 | Paper drawer |
| 4 | Paper drawer release |
| 5 | Connectors (see left side view) |

1. Available first quarter of 2008.

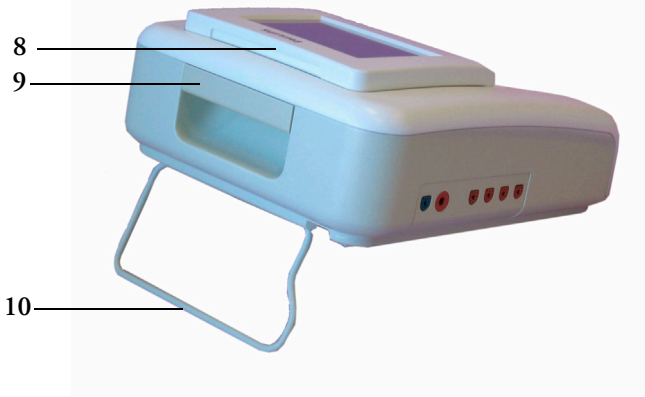
Right Side




6 ON/OFF switch

7 Power connector

Rear

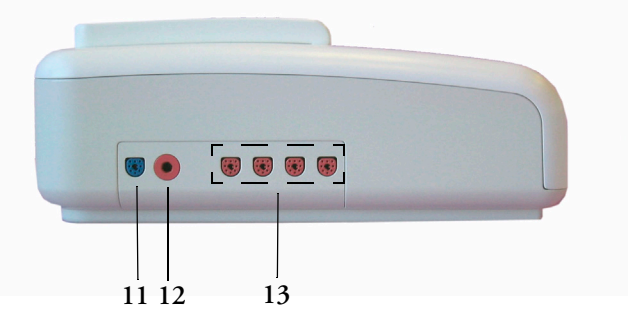



8 Display release

9 Carrying handle

10 Built-in stand

Left Side



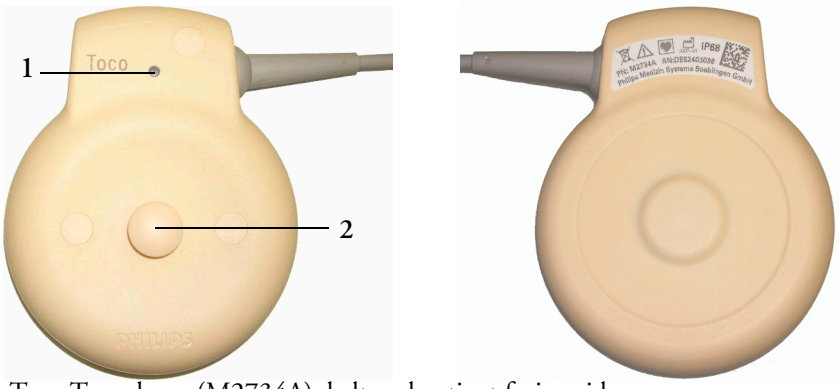

11 $SpO_2$ socket (optional, FM30 only)

12 Noninvasive blood pressure socket (optional)

13 Fetal sensor sockets - each socket accepts any fetal transducer, an Avalon CTS Cordless Fetal Transducer System base station (connected via the interface cable M2731-60001), or event marker

# Overview Transducers

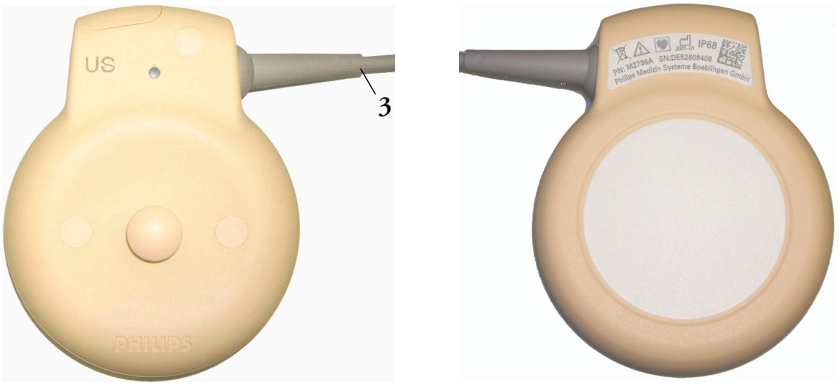
Transducer Overview




Toco Transducer (M2734A), belt and patient facing sides

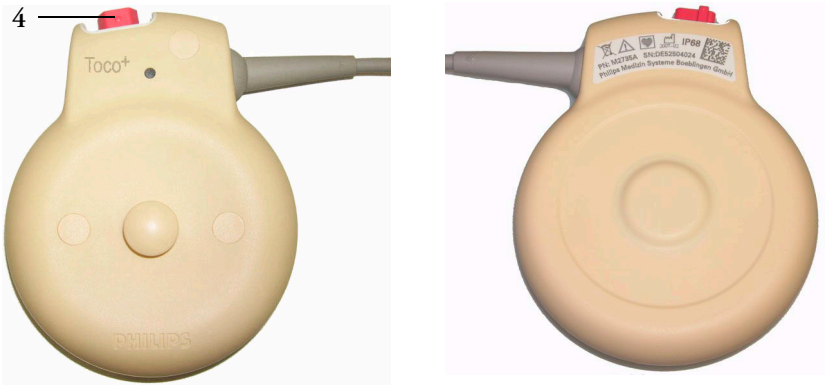
1 Transducer Finder LED - lights up on the transducer providing the measurement source.

2 Belt Button




Ultrasound Transducer (M2736A), belt and patient facing sides

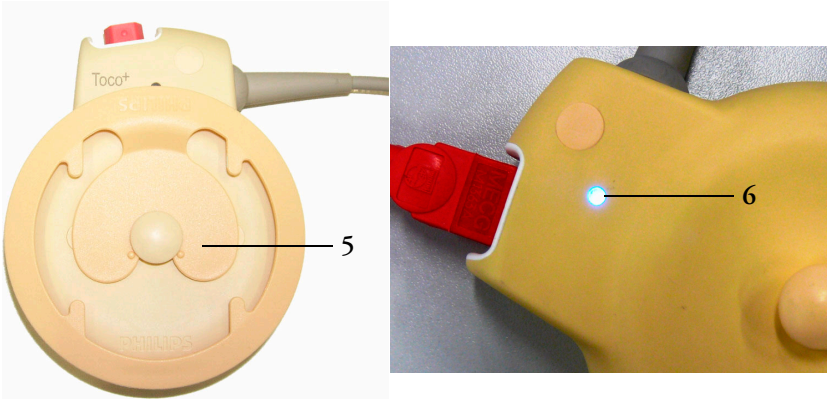
3 Cable - connects to any of the four Fetal Sensor Sockets on the monitor




Toco+ Transducer with ECG/IUP capability (M2735A), belt and patient facing sides

4 Connector - for use when monitoring ECG/IUP

(M2735A Toco+ transducer only)




Toco+ Transducer with ECG/IUP capability (M2735A)

5 Butterfly belt clip (shown fitted; for use with belts without button holes)

6 Transducer Finder LED - lights up on the transducer providing the measurement source.

Patient module for ECG/IUP (M2738A)

7 Connector - for connecting ECG/IUP adapter cables (same as for Toco+ transducer)

8 Cable - connects to any of the four Fetal Sensor Sockets on the monitor

# Related Product

Avalon CTS (M2720A)
Cordless Fetal Transducer System
Use the interface cable M2731-60001

9 Cordless Transducer

10 Base station

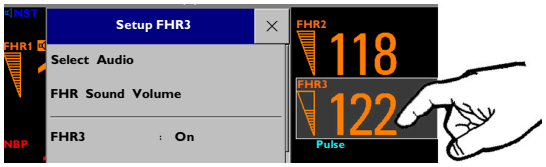
11 ECG Transducer

# Human Interface

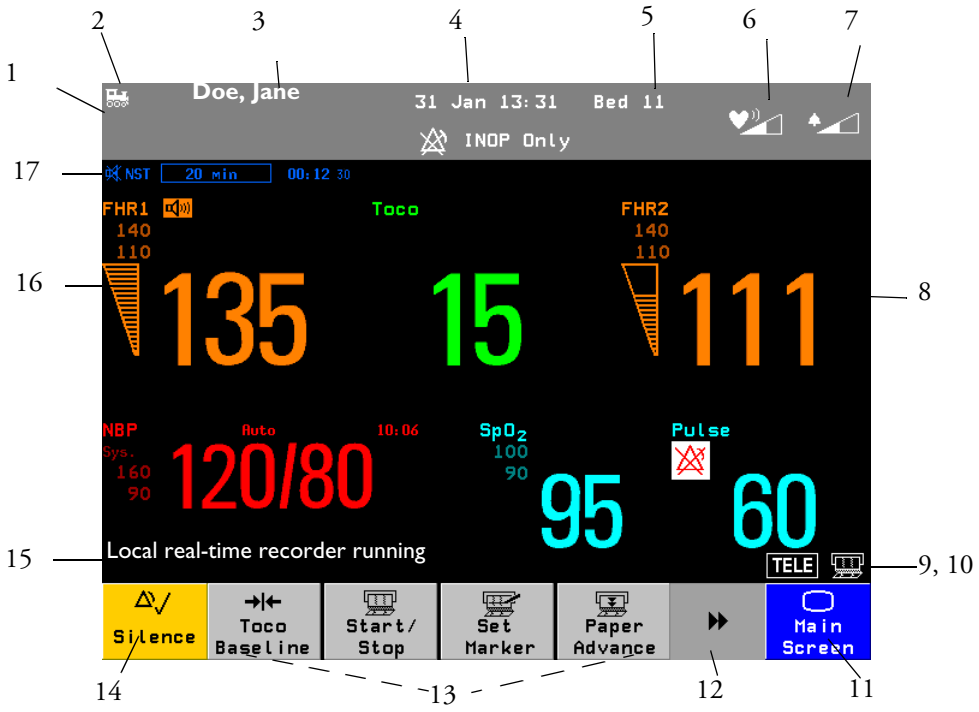
## Touchscreen Operation

Your monitor has a touchscreen. Everything you need to operate the monitor, other than to turn it on and off, is contained on its screen. Most screen elements are interactive. Screen elements include measurement numerics, screen keys, information fields, status indicators, alarms fields and menus.

For example, when you touch a measurement numeric that measurement's Setup menu opens, from which you can make your selection. This may be another menu, or a pop-up list from which to pick an item.



# Touchscreen Content




| Screen Elements | |
|---|---|
| **Item** | **Description** |
| Monitor Information Line | |
| 1 | INOP and alarm status area - shows active alert messages |
| 2 | LAN connection status indicator only. RS232 system connection is not indicated.<br>Monitor connected to OB TraceVue<br>LAN cable connected, but no connection to OB TraceVue<br>If no indicator is shown, there is no network connection. |
| 3 | Patient identification |
| 4 | Date and time |
| 5 | Bed label (when connected to a Philips OB TraceVue system) |
| 6 | Fetal heart sound volume adjust/indicator |
| 7 | Alarm volume adjust/indicator |
| Other Screen Elements | |
| 8 | Numeric/measurement values |

| Screen Elements | |
|---|---|
| **Item** | **Description** |
| 9 | Status indicator - for fetal trace recorder<br> Fetal recorder On<br> Fetal recorder Off<br> Recorder problem that can be solved by the user (for example, paper jam, paper out, wrong paper scale set)<br> Fetal recorder is defective. Call service. |
| 10 | Status indicator - for Avalon CTS system:<br> An Avalon CTS Cordless Fetal Transducer System is connected and powered on.<br> An Avalon CTS Cordless Fetal Transducer System is connected and powered on, but is disabled because wired transducer(s) connected |
| 11 | Close all open menus and windows and return to main screen |
| 12 | Scroll to display more SmartKeys |
| 13 | SmartKeys - these can vary according to your monitor's configuration |
| 14 | **Silence** - key which acknowledges all active alarms by switching off audible alarm indicators |
| 15 | Status line - shows status and prompt messages |
| 16 | Signal quality indicator:<br> Good/full<br> Acceptable/medium<br> Poor/no signal |
| 17 | NST timer |

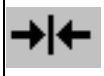
## Permanent Keys

A permanent key is a graphical key that remains permanently on the screen, giving you fast access to functions.

| | |
|---|---|
| | **Silence** - acknowledges all active alarms by switching off audible alarm indicators. |
| | **Main Screen** - closes all open menus and windows and returns to the main screen. |

## SmartKeys

SmartKeys are graphical keys, located at the bottom of the main screen. They give you fast access to functions. The selection of SmartKeys available on your monitor depends on your monitor configuration and on the options purchased.

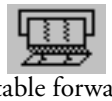
| | | | |
|---|---|---|---|
| | **Main Setup** - enter main setup menu. | | Recorder **Start/Stop** - turn the trace recorder on or off. |
| | **Pause Alarms** - pauses alarm indicators. Pause duration depends on monitor configuration. If pause duration is infinite, this key is labeled **Alarms Off**.<br>Select again to immediately re-enable alarm indicators. | | **Paper Advance** - advance the paper automatically to the next fold. Disabled when the recorder is running. |
| | enter patient identification menu to admit/discharge | | enter notes |
|  | reset Toco baseline | | **Timer** - enters NST timer window |
| | load User Default | | mark an event |
| | - start/stop manual noninvasive blood pressure measurement<br>- start auto series<br>- stop current automatic measurement within series | | stop all noninvasive blood pressure measurements |

## Pop-Up Keys

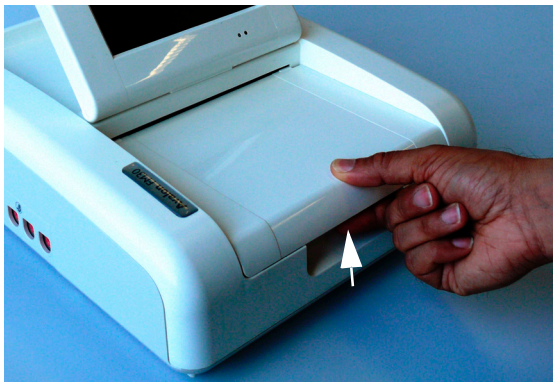
Pop-up keys are context-sensitive graphical keys that appear automatically on the monitor screen when required. For example, the confirm pop-up key appears when you need to confirm a change.

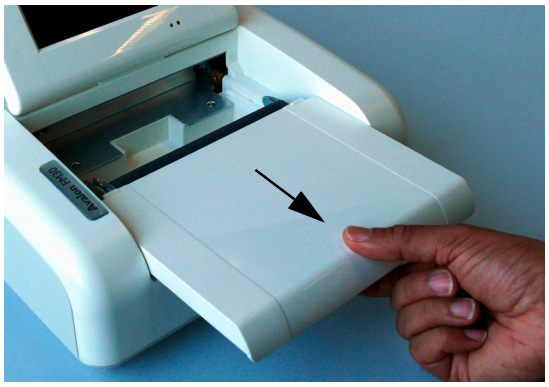
## Loading Paper

To load a new pack of paper:

1 If the recorder is on, press the recorder **Start/Stop** SmartKey  to turn it off.

2 Press the paper table release to unlock the paper drawer. Pull the table forward to open it fully.

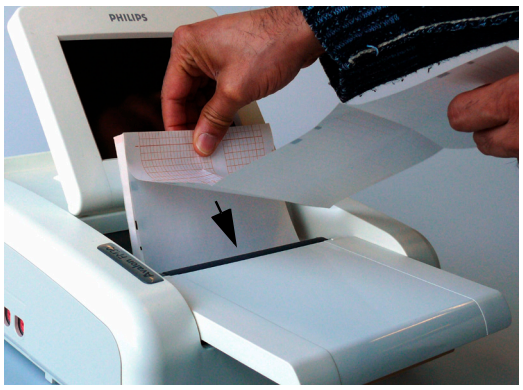




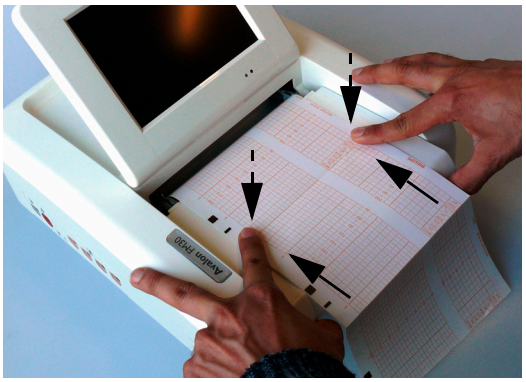
3 Prepare to place the new pack of paper in the tray with the bottom side down. The bottom side is indicated by the word STOP printed on the final page of the new pack.

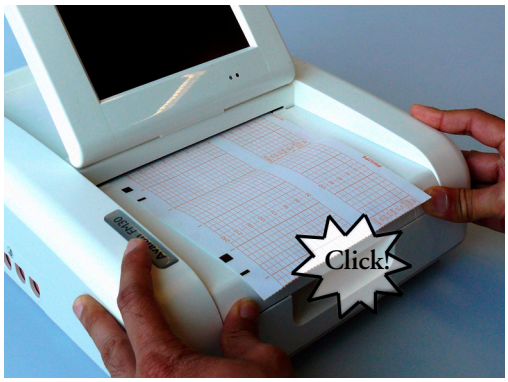
4 Unfold the top page of the pack and position the uterine activity scale on the right.

5 Slide the pack into the tray.




6 Push the paper drawer back until it “clicks” closed.






7 Press the recorder **Start/Stop** SmartKey to switch on the recorder.

2

# Training Objectives

## Competency Statement

The Student will be able to perform the basic monitoring functions.

## Performance Objectives

The following objectives provide evidence of minimum achievement of the above competency. The student will explain or demonstrate how to:

1. Identify the components of the fetal monitor and the basic principles of monitoring.
2. Identify the parts of a trace.
3. Understand what the monitor does when it performs a self-test.
4. Load and advance the recorder paper.
5. Use the touchscreen to change settings.
6. Perform a transducer check.
7. Mark events and annotate a recording.
8. Administer patient data.
9. Identify and connect the ultrasound (US) transducers.
10. Adjust the fetal heart rate (FHR) volume.
11. Explain and use the FHR offset feature for twin and triplet FHR monitoring.
12. Identify the symbol for cross channel verification that is printed on the recorder paper.
13. Identify and use FMP.
14. Identify and connect the Toco transducer.
15. Identify and connect the DECG accessories.
16. Identify and connect the intrauterine pressure (IUP) catheter.
17. Identify, set and react to alarms.
18. Identify and set artifact behavior.
19. Identify the maternal vital sign measurements available and connect the appropriate cables for the measurements.

# Maternal Parameters

1. Distinguish the pulse source for the maternal heart rate.
2. Obtain the maternal ECG waveform.
3. Perform a maternal $SpO_2$ measurement.
4. Identify the NBP setup screens and obtain a reading.

# Cordless Monitoring

1. Describe the interface of the telemetry receiver to the fetal monitor.
2. Identify the steps to successfully connect the fetal telemetry system to a fetal monitor, and disconnect the fetal telemetry from a fetal monitor.

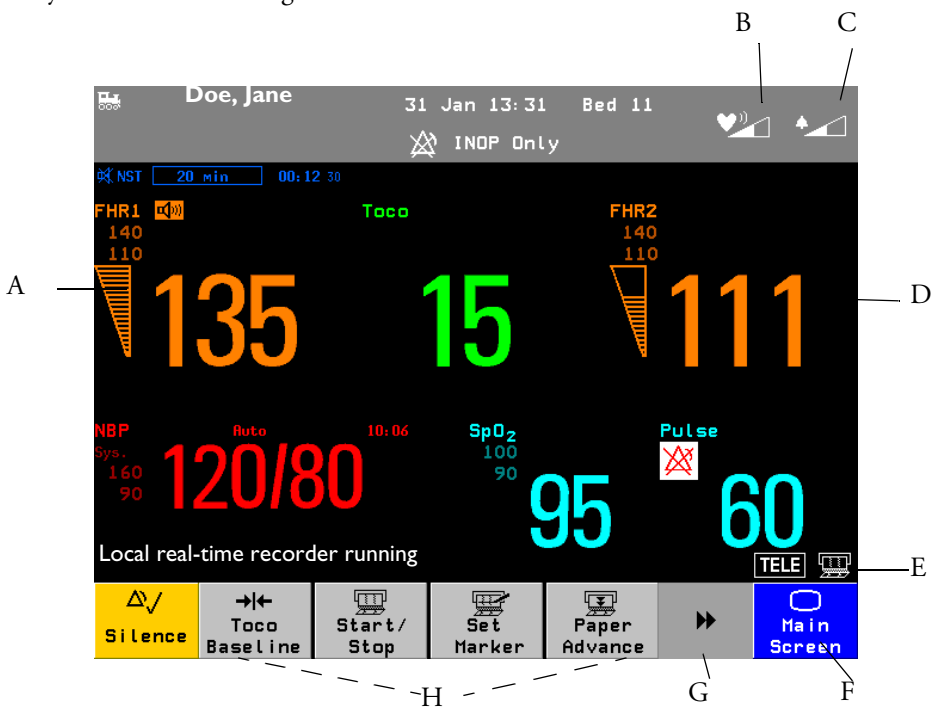
# Resources

If there are additional questions, or for any additional information on using the Avalon FM20 / FM30 or the Avalon Cordless Fetal Transducer System, please refer to the Instructions for Use. If possible, please also refer to the Avalon FM20 / FM30 Training Video for additional information.

# Fetal Monitor Lab Exercises

## 1 Basic Operation

1 Identify each of the following items and describe its function:




A. _____ Description: _____

B. _____ Description: _____

C. _____ Description: _____

D. _____ Description: _____

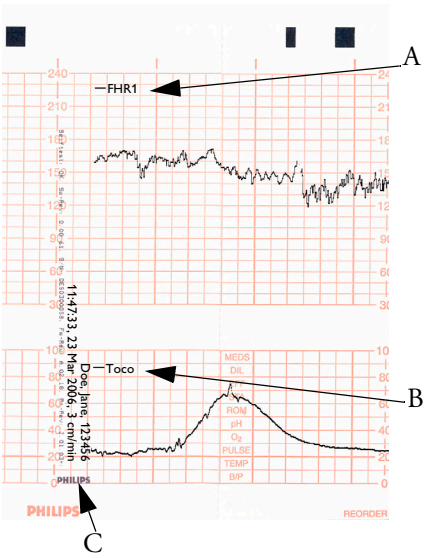
E. _____ Description: _____

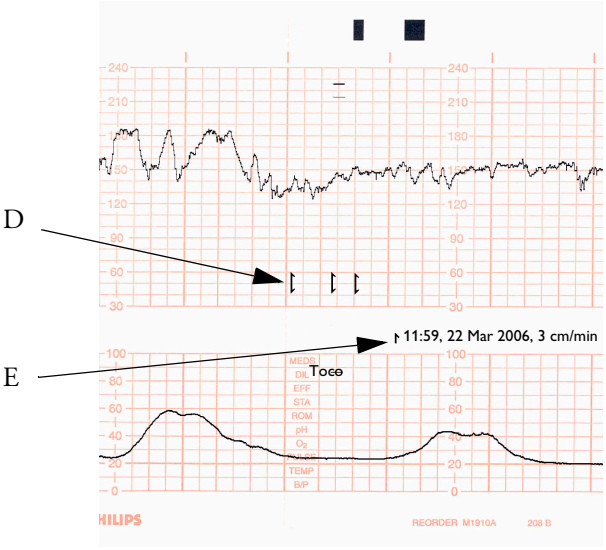
F. _____ Description: _____

G. _____ Description: _____

H. _____ Description: _____

2 Identify each of the following items:




A. _____

B. _____

C. _____

D. _____

E. _____

3 Confirm _____ before you start monitoring, and continue to confirm that the _____ is the signal source for the fetal heart rate during monitoring.

4 Load paper in the recorder.

5 Turn the monitor on. The monitor performs a power-on self-test as it starts up. No user interaction is required.
How do you know the self-test has completed successfully?

_____

_____

6 Set the date and time to July 4th, 2007, at 13:30.

7 **a** Check the paper scale setting.

**b** Can you change this setting in Monitoring Mode?

_____

8 Describe the two ways to enter the Fetal Recorder menu.

**a** _____

**b** _____

9 Check/set the paper speed to 3 cm/min.

**10** Turn on the recorder. List three items that will be visible at the start of a recording.

**a** _____

**b** _____

**c** _____

**11** How can you tell at a glance whether the recorder is running or not?

_____

**12** You should always tear off paper along a perforation. True or False?

**13** With the recorder on, mark an event.

**14** What symbol is displayed on the recorder paper when an event is marked?

_____

**15** Where would you plug in the external event marker?

_____

**16** Your monitor comes with a set of preconfigured notes. Enter one of these notes.

**17** Where does the note appear?

_____

**18** Your technical department can configure your own set of notes in Configuration Mode. True or False?

_____

**19** In the event that the monitor's recorder paper runs out, the monitor is capable of storing trace data in its internal memory for up to:

**A.** 24 hours, if you are only monitoring one fetus.

**B.** 35 minutes.

**C.** One hour.

**20** If the monitor runs out of paper and new paper is loaded after 40 minutes, what would you expect to happen (if the Bridge Paperout setting is on)?

_____

_____

**21** Disable the touchscreen and enable it again

**22** List two possible causes of transducer damage in the clinical setting.

_____

_____

# 2 Alarms

1 Your monitor needs to be in alarm mode 'All' to enable FHR alerting. True or false?

_____

2 Which key will silence the alarm?

_____

3 Change the alarm volume.

4 What happens when you select the Silence key?

**A.** All active alarms are acknowledged and silenced

**B.** All alarms are silenced for 10 minutes

**C.** All alarms are switched off for 2 minutes

**D.** All alarms except life threatening alarms are suspended for 2 minutes

5 What is an INOP alarm?

**A.** An alarm condition that only occurs IN the OPerating room

**B.** A patient alarm affecting only yellow alarms

**C.** A technical alarm that indicates an INOPerative condition has occurred

**D.** An alarm that occurs when the user changes the operating mode

6 The Pause Alarms key:

**A.** Turns off all yellow alarms

**B.** Turns off all alarms for 1, 2 or 3 minutes depending on configuration

**C.** Turns off all non critical alarms for 2 minutes

7 How are alarms indicated? (More than one answer may be correct)

**A.** Alarm sounds

**B.** Alarm messages are displayed

**C.** Alarm lamps flash

**D.** Numeric of the measurement in alarm flashes

8 If the pause duration for alarms is configured to infinite, how does the labelling of the Pause Alarms key change?

_____

# 3 Admitting and Discharging Patients

1 Admit a patient. (For Stand alone systems only)

2 Which of the following is/are true?

**A.** You should always admit a patient at the monitor.

**B.** If using an OB TraceVue system, you should admit the patient in the system.

**C.** You should always discharge the patient at the monitor.

**D.** When connected to an OB TraceVue system via a LAN connection, the monitor acts as "master" over patient demographic data.

# 4 Non-Stress Test Timer

1 Set the Non Stress Test timer (NST) for 20 minutes.
When the set time interval has passed, which of the following will happen? (select all that apply)

**A.** A single audible tone is heard.

**B.** Recorder starts a new recording for another 20 minute interval.

**C.** The color on the display changes from blue to green.

**D.** Fetal monitor turns off.

**E.** The recorder stops if NST Autostop is set to **On**.

**F.** A message appears in the status line on the Main Screen display.

# 5 Monitoring FHR and FMP Using Ultrasound

1 How can you check the US transducers to ensure they are working properly?

_____

2 Generate an artificial FHR. Note what happens to the numeric display, and the signal quality indicator.

_____

3 When you are receiving the best possible signal from the ultrasound transducer, the signal quality indicator will be

_____

4 Adjust the FHR volume.

5 FMP is available:

**A.** For all FHR channels.

**B.** Only for the FHR1 channel.

**C.** For the FHR3 channel in the case of triplets monitoring.

**D.** For the FHR channel currently on the loudspeaker.

6 FMP detects

_____

7 How is FMP depicted on a recording?

_____

8 Turn FMP off.

9 FMP should be disabled when monitoring an ambulant patient using cordless transducers from an Avalon CTS system. TRUE or FALSE?

_____

10 Cross-Channel verification (CCV) indicates when monitored heart rates (fetal or maternal) coincide. How do you recognize this on the display and on the trace recording?

_____

11 You should periodically compare the mother's pulse with the signal coming from the fetal monitor's loudspeaker to ensure you are detecting the fetal heart rate.True or False?

_____

# 6 Monitoring Twin and Triple FHRs

1 When monitoring multiple fetal heart rates, you can listen to the fetal heart sound from one ultrasound transducer at a time. How do you know which fetus' heart rate is being heard on the loudspeaker?

_____

2 Connect a second US transducer. Note what happens to the display.

_____

3 Select the fetal heart sound for FHR2.

4 When monitoring twins or triplets, the trace separation by an offset of 20 bpm is helpful because

_____

_____

5 Whether monitoring twins or triplets, which of the following FHR traces does not have an offset?

**A.** FHR1

**B.** FHR2

6 When monitoring twins, how is the trace separation indicated on the recording?

_____

7 When monitoring triplets, what is the offset of FHR 3?

_____

8 a What action should you take when cross-channel verification has been detected?

_____

_____

b How can the Finder LED help in this case?

_____

_____

# 7 Monitoring Uterine Activity Externally

1 Plug in the Toco transducer, and note the reading in the Toco numerical display.

_____

2 How can you check the Toco transducer to ensure it is working properly?

_____

_____

3 How would you identify the Toco transducer when there are also other transducers connected to the monitor?

_____

_____

4 a Reset the Toco baseline.

b What value has the reset baseline?

_____

5 What indication on the recorded trace shows that you are using an external Toco transducer?

_____

6 Why would you want to reduce the Toco sensitivity?

_____

_____

7 Change the Toco sensitivity to 50% and note the effect on the paper trace. Then change it back to 100%.

# 8 Monitoring Uterine Activity Internally

1 Connect the IUP catheter to the patient module via the reusable adapter cable, and connect to the monitor.

2 Zero the intrauterine (IUP) catheter. What baseline value will be displayed?

_____

# 9 Monitoring FHR Using DECG

1 Connect the fetal scalp electrode to the DECG adapter cable. Connect the DECG adapter cable to either the Toco+ transducer or the patient module and connect to the monitor?

2 Artifact suppression (arrhythmia 'logic') applies to the signal from which measurement: US [ ] or DECG [ ]?

3 What is the purpose of artifact suppression?

_____

_____

4 Turn artifact suppression off.

5 Why might you turn artifact suppression off?

_____

# 10 Monitoring Noninvasive Blood Pressure

1 During a NBP measurement, what happens if you select the NBP Start/Stop SmartKey?

**A.** Any current measurement and automatic NBP cycle is stopped.

**B.** Only the current measurement is stopped, the next automatic measurement will occur.

# 11 Monitoring $SpO_2$

1 Connect the SpO2 sensor to the blue socket on the monitor, and take a measurement.

2 If **`Tone Modulation`** is set to **`Yes`**, what effect does this have?

3 Change the QRS volume.

4 The $SpO_2$ desaturation alarm: (select all that apply)

**A.** Is a red level alarm

**B.** Is a yellow level alarm

**C.** Sounds immediately if the current $SpO_2$ is less than the **`Desat Limit`**

**D.** Sounds if the current $SpO_2$ is less than the **`Desat Limit`** and the desat alarm delay time has elapsed

5 If you turn the $SpO_2$ alarm off in the $SpO_2$ setup menu, the alarm will remain off: (select all that apply)

**A.** Until you change the $SpO_2$ alarm limits

**B.** For 3 minutes

**C.** For 5 minutes

**D.** Until you turn it back on

# 12 Monitoring Maternal Heart / Pulse Rate

1 Connect the MECG adapter cable to the Toco+ transducer and attach the electrodes.

2 How would you start printing the MECG waveform?

_____

_____

3 What is the difference between the two choices for printing the MECG waveform, **`Separate`** and **`Overlap`**?

4 To change the MECG alarm limits (in Alarm mode: ALL): (More than one answer may be correct)

**A.** Select the MECG numeric to open the setup menu

**B.** Select the MECG waveform to open the setup menu

**C.** Select **`Main Setup`** key > **`Measurements`** > **`ECG`**

# 13 Cordless Monitoring

1 Which of the following are true for cordless fetal transducers?

A. Toco, ultrasound and ECG transducers are not affected by use in the bath or shower.

B. DECG and MECG measurements are validated for use under water.

C. Water pressure and temperature can affect the Toco baseline.

D. The water affects the transmission range of the transducers

E. Pulsating water jets can cause artefacts.

2 Name two types of information that are shown on the two-digit display on cordless fetal transducers.

_____

_____

3 How many Avalon CTS systems can you connect to the fetal monitor?

_____

4 Which of the following is/are true (select all that apply)?

**A.** You can monitor twins, but not triplets, using cordless transducers.

**B.** You can use a mixture of wired and cordless transducers.

**C.** Wired transducers have priority over those of an Avalon CTS system.

**D.** To use cordless transducers, disconnect all wired transducers from the monitor.

5 How do you connect an Avalon CTS system to the monitor?

_____

6 What do the following indicators mean?

| Indicator | Meaning |
|---|---|
| | |
| | |

7 When changing back from cordless to wired transducers, put the following list in the correct order:

**A.** Connect wired transducers to the monitor.

**B.** Switch the base station to stand-by

**C.** Dock the cordless transducers in the Avalon CTS base station.

**D.** Continue monitoring.

B

# Answers to Lab Exercises

## 1 Basic Operation

1 **A.** Signal Quality Indicator - indicates how good the signal is from the US transducer.

**B.** Fetal heart sound - volume adjust / indicator.

**C.** Alarm - volume adjust/indicator.

**D.** Numeric/measurement values

**E.** Status indicators - for fetal trace recorder and for Avalon CTS system.

**F.** Main screen - closes all open menus and windows and returns to the main screen

**G.** Scroll - to display more SmartKeys.

**H.** SmartKeys - these can vary according to your monitor's configuration.

2 **A.** Heart rate label

**B.** Uterine activity label

**C.** Vertically printed trace header

**D.** Event marker

**E.** Time stamp printed every ten minutes

3 Confirm __**fetal life**__ before you start monitoring, and continue to confirm that the __**fetus**__ is the signal source for the fetal heart rate during monitoring.

4 –If the recorder is on, press the recorder Start/Stop SmartKey to turn it off.

–Press the paper table release to unlock the paper drawer and then pull the table forward to open it fully.

–Lift out any remaining paper from the tray.

–Prepare to place the new pack of paper in the tray with the bottom side down. The bottom side is indicated by the word STOP printed on the final page of the new pack.

–Unfold the top page of the pack and position the uterine activity scale on the right.

–Slide the pack into the tray.

–Push the paper drawer back until it "clicks" closed.

–Press the recorder Start/Stop SmartKey to switch on the recorder.

5 After boot up the monitor sounds a tone, and you can see the monitoring main screen. If recorder power-on auto-start is configured to On, the recorder prints "Selftest OK" across the trace paper.

6 **a** Select the **Date, Time** screen element from the monitor's info line to enter the Date, Time menu.

**b** Select, in turn, the **Year, Month, Day, Hour** (in 24 hour format) and **Minute** as necessary.

**c** Select **Store Date, Time** to change the date and time.

If connected to a Philips OB TraceVue system, the monitor uses the OB TraceVue system date and time, including daylight saving time changes.

7 **a**

1. Enter the **Main Setup** menu by selecting the SmartKey .
2. Select **Fetal Recorder**.
3. Check the current setting for Scale Type. If it is not appropriate, change it in the Fetal Recorder menu in Configuration Mode:
4. Select **Scale Type** to toggle between **US** and **Internat'l**.

**b** In Monitoring Mode, you can see these settings (grayed out), but you cannot change them. They can be changed in Configuration Mode.

8 **a** -> **Fetal Recorder**

**b** Touch the Recorder Status Indicator.

9 To set the paper speed:

**a** Enter the **Main Setup** menu using the SmartKey .

**b** Select **Fetal Recorder**.

**c** In the Recorder menu, you can see the current speed setting. Select **Recorder Speed**.

**d** Select the desired speed from the given choices: **1**, **2** or **3** cm/min.

10 Any three of the following:

**a** Selftest OK": confirmation that the monitor's self-test completed successfully

**b** the software revision and firmware revision

**c** the serial number

**d** the time

**e** the date

**f** patient name and medical record number (if entered)

**g** the paper speed

**h** the parameters plugged in.

11 By checking the Recorder Status Indicator.

12 True.

13 To mark an event on the trace paper you can:

–Either select the **Set Marker** SmartKey .

–Or press the button on the remote event marker. The remote event marker is connected to the monitor via any fetal transducer socket.

14 Event marker symbol , on the FHR scale at the exact time the button or key was pressed.

15 Into any of the four (pink) fetal sensor sockets.

16 To enter a note:

a Press the Enter Notes SmartKey to open the Enter Note menu.

b Scroll if necessary, then select the note you wish to enter. A confirmation dialog box opens:

| | | |
|---|---|---|
| To store and record the note select Confirm.<br>Select cancel to reject the current note | **Confirm** | **Cancel** |

c Select Confirm to enter the note. The note is then shown in the status line of the display and is annotated on the fetal trace if the fetal recorder is on.

17 Notes are printed in the space between the FHR grid and the uterine activity grid and also appears in the display status line.

Extra info: Two notes can be printed directly and in addition, the monitor can temporarily store two notes. These temporarily stored notes are printed after the first two have been recorded. Any further notes beyond the two stored notes are discarded. For example, if you enter six notes in quick succession, the first two notes that are entered record immediately, the next two are stored in memory and then printed when the first two have been recorded, and the last two are discarded.

If the printing of two notes happens to coincide with the regular recording of the time stamp that takes place once every ten minutes, the time stamp is delayed until the notes have finished printing.

18 True.

19 C.

20 If the paper has run out and you load new paper, all trace data for the period (up to one hour) of when the paper was out is stored in memory and printed out automatically at high speed as soon as the recorder restarts. For this, the Bridge Paperout setting must be On (default). As the paper was out for 40 minutes (less than 1 hour), all data would be safeguarded and printed on the recorder trace first, before carrying on with the real-time trace recording.

21 To temporarily disable touchscreen operation of the monitor, press and hold the **Main Screen** permanent key for about three seconds. A red padlock will blink on the Main Screen permanent key.

Press and hold the **Main Screen** permanent key again for about three seconds to re-enable touchscreen operation.

22 The major way a transducer can be damaged is by improper handling such as dropping the transducers, running over them with a bed, or wrapping the cords too tightly.

# 2 Alarms

1 True. Your monitor needs to be in alarm mode ‘All’ to enable any alarming, including fetal heart rate alarming.

2 The Silence Smartkey.

3

This **alarm volume indicator** at the top right of the monitor screen gives you an indication of the current alarm volume. To change the volume:

**a** Touch **alarm volume indicator**.

**b** Pick the required volume from the pop-up volume scale.

4 A.

5 C.

6 B.

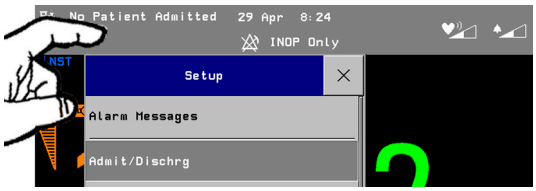
7 A, B, D. Fetal monitor, unlike IntelliVue, has no alarm lamps.

8 The labelling changes to **`Alarms Off`**.

# 3 Admitting and Discharging Patients

1 To access the **Patient Demographics** window:

**a** Touch the gray information line at the top of the screen then select **`Admit/Dischrg`** from the menu that opens:




**b** Touch the **`Admit Patient`** pop-up key.

**c** Enter Last Name, using the on-screen keyboard, and press enter.

**d** Repeat for First Name and MRN, then select **`Confirm`**.

2 B and C.

# 4 Non-Stress Test Timer

1 A, C, E, F.

# 5 Monitoring FHR and FMP Using Ultrasound

1 If any of the following tests fail, repeat the test using another transducer. If the second transducer passes the tests, confirming that the first transducer is defective, contact your service personnel. If the second transducer also fails the tests, contact your Philips Service Engineer or Response Center.

To test an ultrasound transducer:

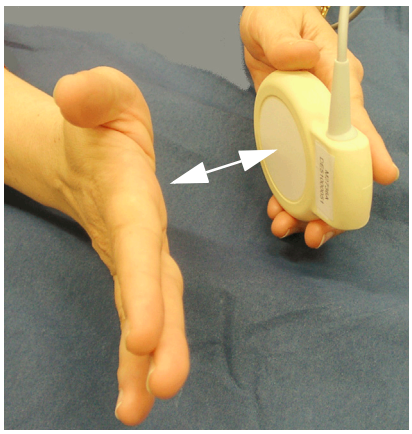
**a** Switch on the monitor and the recorder.

**b** Connect the transducer to the fetal monitor.

**c** Select the fetal heart sound for this channel.

**d** Increase the loudspeaker volume to an audible level.

**e** Holding the transducer in one hand, move your other hand repeatedly towards and then away from the surface, or lightly tap to generate sound.



**f** Check that a noise is heard from the loudspeaker. The loudspeaker should beep for each simulated beat.

2 See the answer above. The value on the numeric display should increase with increased frequency of moving the hand/tapping. The signal quality indicator will vary in how full it is showing. A good, regular signal will make the signal quality indicator full, whereas with a weak signal it will be empty. An acceptable trace is possible with medium/acceptable state.

3 Full.

4 To change the fetal heart sound volume:

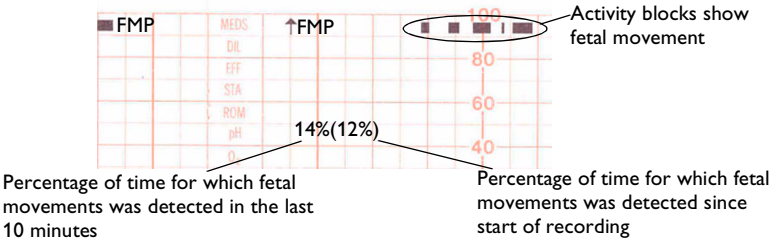
**a** Touch the symbol.

**b** Pick the required volume from the pop-up volume scale.

5 B.

6 FMP detects gross fetal body movements via an ultrasound transducer.

7 FMP is shown by activity blocks on the recording.
Statistics for the amount of activity are also given.




8 You can switch FMP on and off from any FHR channel. For example, to set it from the FHR1 channel:

**a** Enter the **`FHR1 Setup Menu`**.

**b** Select **`Fetal Movement`** to toggle between **`On`** and **`Off`**.

c Return to the main screen.

9 True.

10 CCV indicates when monitored heart rates (fetal or maternal) coincide, by displaying the symbol ? on the screen, and ? on the trace recording.

11 True.

# 6 Monitoring Twin and Triple FHRs

1 You see the audio source symbol next to the FHR numeric label for the channel you are listening to: FHR2

2 The display automatically adjusts the screen for the new numeric.

3 To select the fetal heart sound:

a Enter the **Setup FHR** menu for the channel you want to hear.

b Press **Select Audio**. It may take a few seconds for the audio source symbol to appear.

4 When monitoring multiple fetal heart rates, the FHR offset is helpful because you can separate the similar baselines for easier interpretation of the recorded trace. The FHR value displayed on the fetal monitor is the correct value.

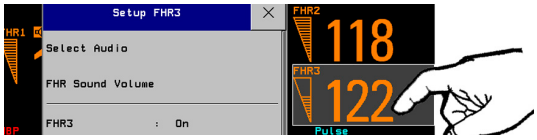
5 A. The trace always displays FHR 1 without an offset.

6 The trace depicts that the offset is active by a vertical dotted line on the FHR 2 trace with the symbol of +20. This is repeated every 5 cm of trace.

7 When monitoring triplets, FHR has a baseline offset of -20 bpm.

8 a Reposition the transducers using the sound from the loudspeaker to ensure that each US transducer is picking up the sound from a distinct fetus.

b Touch a FHR numeric on the screen...




...and the bright, blue **Finder LED** lights up on the corresponding transducer monitoring that channel. This lets you rapidly identify the transducer, so that you can reposition it speedily.

# 7 Monitoring Uterine Activity Externally

1 After plugging in, Toco numeric appears on screen and the Toco value (unloaded) should be around 18 to 22. Press on the Toco transducer and note the pattern on the trace and value on the screen.

2 If any of the following tests fail, repeat the test using another transducer. If the second transducer passes the tests, confirming that the first transducer is defective, contact your service personnel.

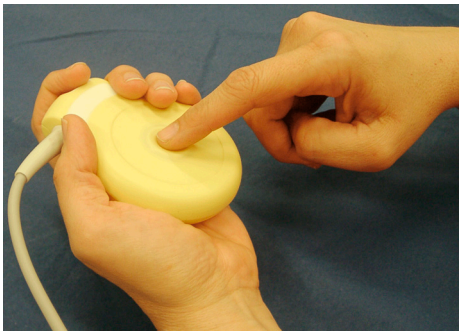
If the second transducer also fails the tests, contact your Philips Service Engineer or Response Center.

To test a Toco transducer:

**a** Switch on the monitor and the recorder.

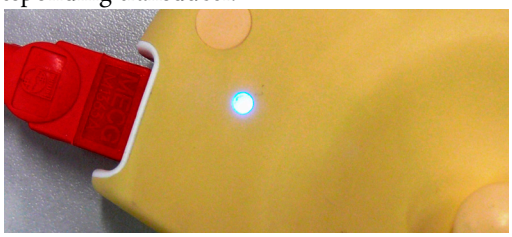
**b** Connect the transducer to the fetal monitor.

**c** Gently apply pressure to the pick-up button.



**d** Check that the value on the display and paper shows this change in pressure.

3 The blue Finder LED on a wired fetal transducer illuminates when you touch the measurement on the screen, allowing you to identify the corresponding transducer.



4 **a** Press the .

**b** 20

5 The trace will display ‘Toco’ to indicate an external Toco transducer is in use.

6 If the Toco trace exceeds the paper scale, you can reduce the Toco sensitivity to 50% so that the trace stays within the scale (default = 100%).

7 To change the Toco sensitivity:

**a** Touch the **`Toco`** numeric to enter the **`Setup Toco`** menu.

**b** Touch **`Toco Gain`** to toggle between **`100%`** and **`50%`**.

Note: Under normal circumstances, the toco should be zeroed correctly first before adjusting the gain.

A wave may exceed 100 because the resting tone is too high. If, after repositioning or zeroing the transducer, the wave still exceeds 100, adjust the gain.

# 8 Monitoring Uterine Activity Internally

1 Illustration ① shows the complete connection chain from the IUP catheter to the fetal monitor using the patient module:

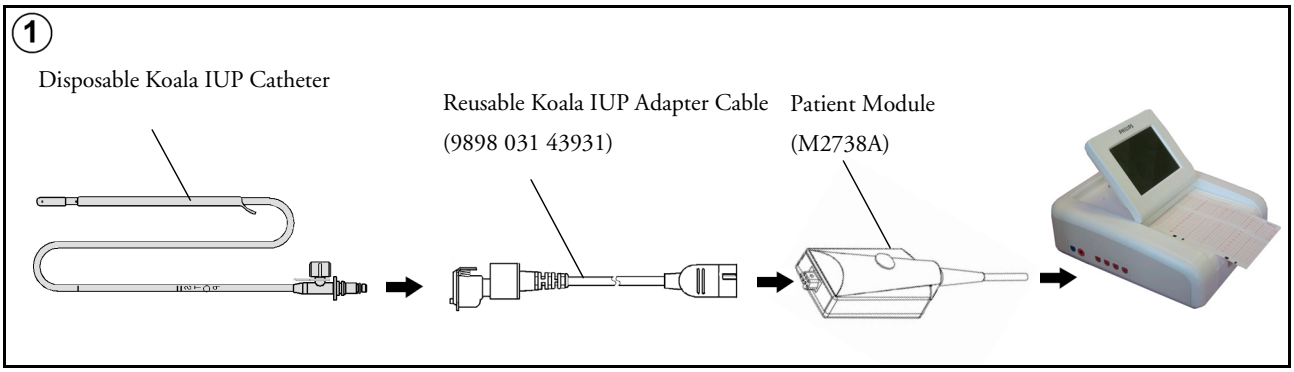
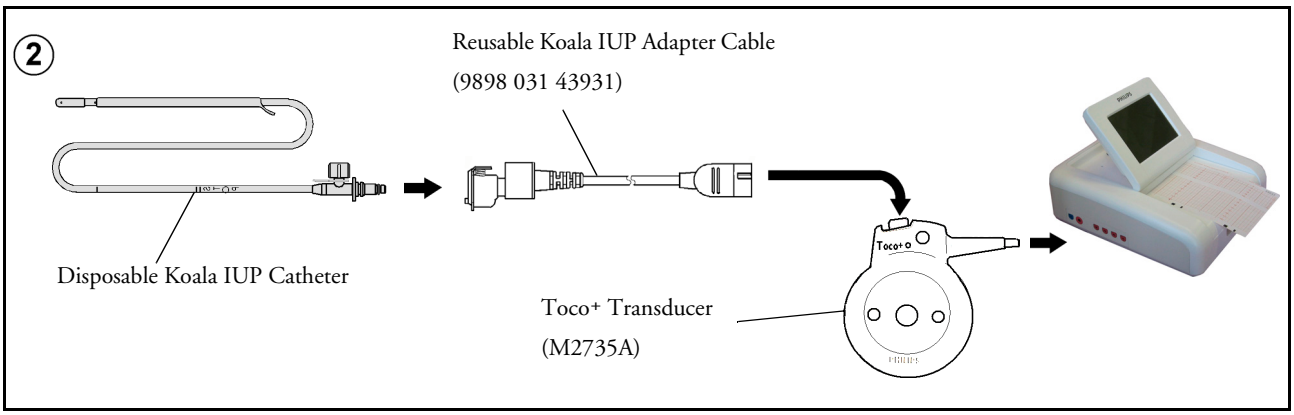



Illustration ② shows the complete connection chain from the IUP catheter to the fetal monitor using the Toco+ transducer:




2 In the **`Setup IUP`** menu, select **`Zero IUP`**. The value is zero.

# 9 Monitoring FHR Using DECG

1 Illustration ① shows the complete connection chain from the fetal scalp electrode to the fetal monitor using the Toco+ transducer.

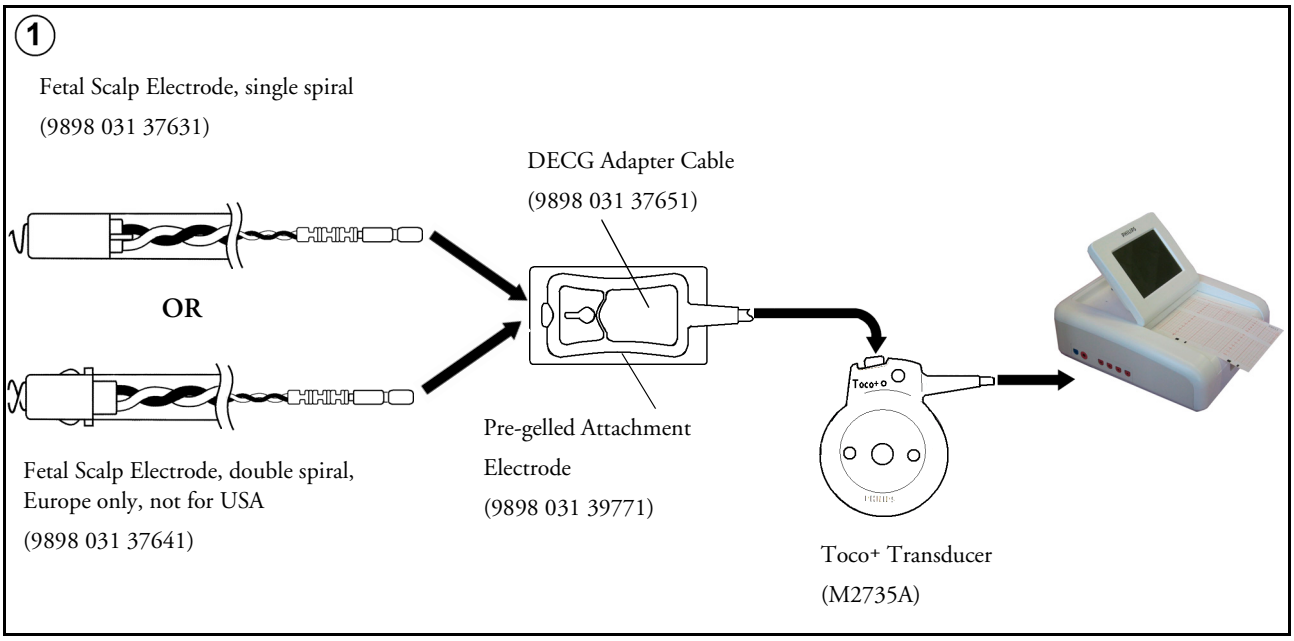
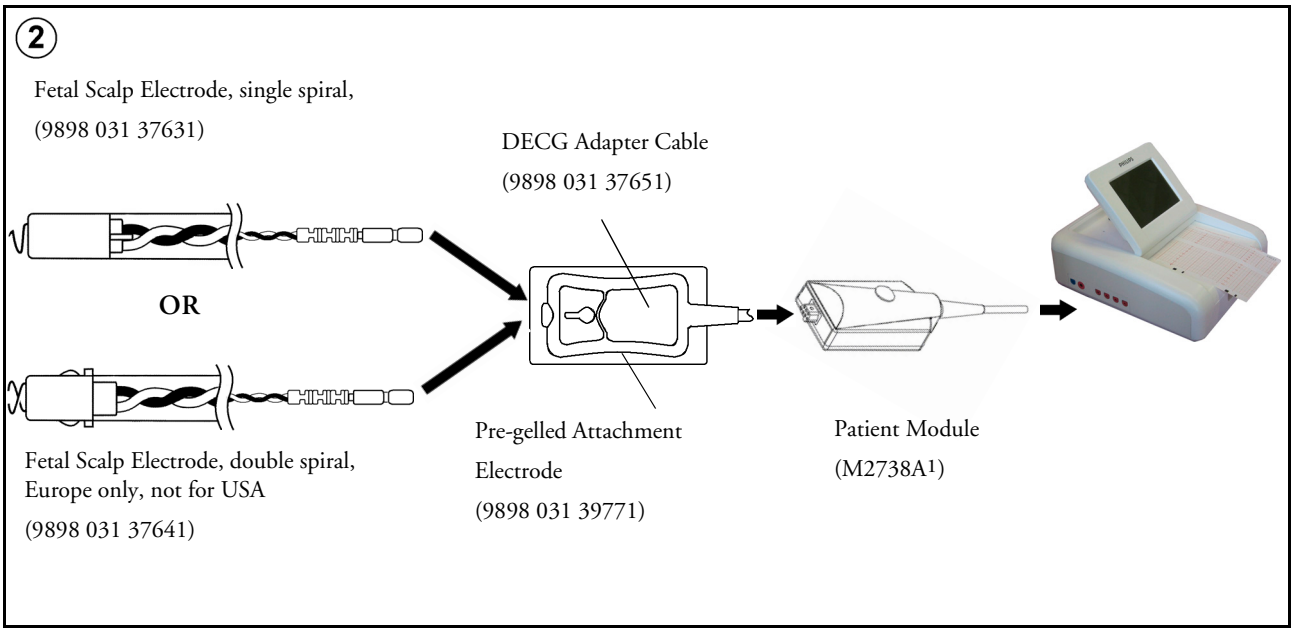



Illustration ② shows the equivalent chain using the patient module.




2 DECG.

3 The purpose of artifact suppression is to avoid recording artifact. When on, it does not record instantaneous heart rate changes of greater than 28 bpm and resumes when successive beats fall in predetermined limits. The FHR numeric displays the detected value and the audio speaker beeps appropriately for each beat detected.

4 To turn artifact suppression On and Off:

**a** Touch the DFHR numeric to enter the DFHR menu.

**b** Select **ArtifactSuppress** to toggle between **On** (artifacts are suppressed) and **Off** (no artifact suppression, **use this setting if you suspect fetal arrhythmia**).

5 When you suspect fetal arrhythmia.

# 10 Monitoring Noninvasive Blood Pressure

1 B.

# 11 Monitoring $SpO_2$

1 The SpO2 numeric appears, with a readout of the oxygen saturation.

2 If tone modulation is on, the QRS tone pitch lowers when the $SpO_2$ level drops. Remember, the QRS tone is derived from either heart rate or pulse depending on which is currently selected as the active alarm source.

3 In the **`Setup SpO2`** menu, select **`QRS Volume`** and set the appropriate QRS tone volume.

4 A, D.

5 D

# 12 Monitoring Maternal Heart / Pulse Rate

1 Illustration ① shows the complete connection chain from the foam electrodes applied to the patient to the fetal monitor using the patient module.

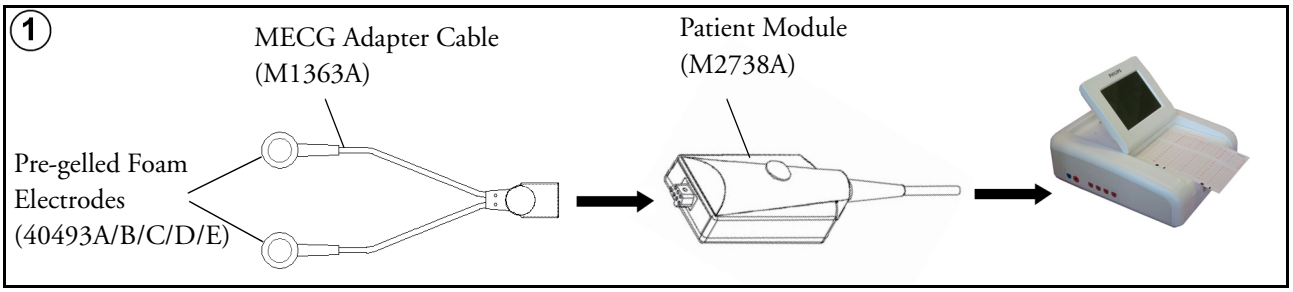
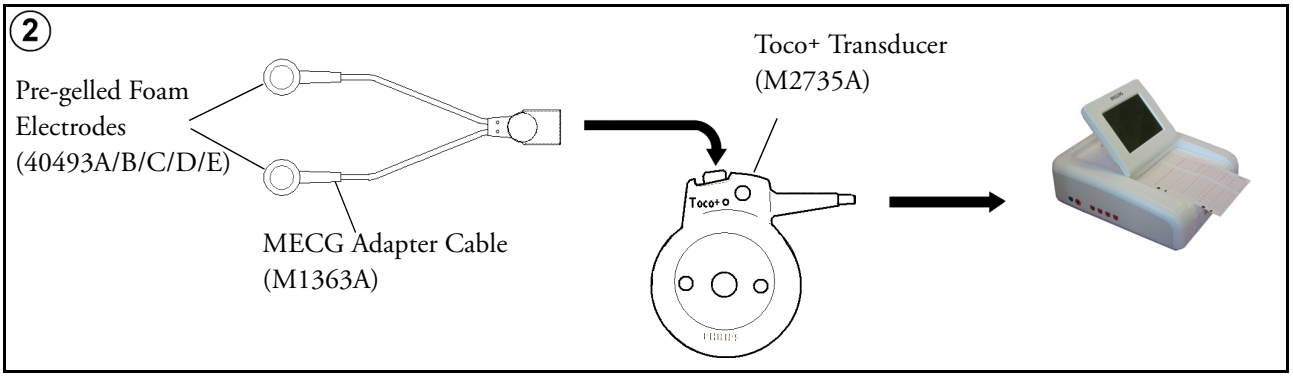



Illustration ② shows the equivalent chain using the Toco+ transducer.



2 Either:

a Enter the **Main Setup** menu by selecting the SmartKey .

b Select **Fetal Recorder** to enter the Fetal Recorder menu.

c Select **Start ECG Wave**.

Or:

Touch the MECG wave.

Select **Start ECG Wave** from the ECG Wave menu.

3 **Separate**: records a six-second MECG strip in fast printout mode. This is in real-time, so temporarily interrupts fetal trace recording while MECG strip prints.

**Overlap**: records a delayed six-second MECG snapshot for documentation on the fetal trace, without interrupting the fetal trace.

4 A, C.

# 13 Cordless Monitoring

1 A, C, D and E.

2 Any two of: the unique base station identification number (bed label), error and warning codes, configuration settings.

3 One Avalon CTS Cordless Fetal Transducer System can be connected at a time.

4 C, D.

5 Via the Avalon CTS interface cable M2731-60001, connects to any of the four fetal sensor sockets.

6

| Indicator | Meaning |
|---|---|
| | Avalon CTS is connected and powered on, and there are no wired fetal transducers connected at the same time. Avalon CTS is enabled. |
| | Avalon CTS is connected and powered on, but there is at least one wired fetal transducer connected. As wired transducers have priority over cordless transducers, the Avalon CTS system is disabled. |

7 C, B, A, D.

## A

alarm status area 6
alarms
  active $SpO_2$ source 10
  volume
    indicator 6
Alarms Off key 8
Avalon CTS
  status indicator 7

## B

bed label, OB TraceVue 6
belt
  butterfly clip 4
butterfly belt clip 4

## C

clip for belt 4

## E

ECG
  patient module 10
Enter Notes SmartKey 8
entering notes 8
event marker
  key 2
  remote 2

## F

FHR
  volume indicator 6
finder LED 3

## I

information line 6

## K

keys
  admit/discharge 8
  Alarms Off 8
  Enter Notes 8
  Main Screen 7
  Main Setup 8
  Paper Advance 8
  Pause Alarms 8
  recorder Start/Stop 8
  scroll 7
  Set Marker 8
  Silence 7
  SmartKeys 7, 8
  start blood pressure measurement 8
  stop blood pressure measurement 8
  Timer 8
  Toco Baseline 8
  User Default 8

## M

Main Screen key 7
Main Setup key 8
MECG
  connection illustration 10
  patient module 10
  using Toco+ transducer 10
MHR
  connecting equipment 10
monitor
  information line 6

## N

navigating
  SmartKeys 8
network connection indicator 6
NST timer 7

## O

OB TraceVue
  bed label 6
operating
  SmartKeys, using 8

## P

Paper Advance key 8
patient identification 6
patient module
  ECG 10
Pause Alarms key 8

## R

recorder
  status indicator 7
recorder Start/Stop key 8
remote event marker 2

## S

scroll key 7
Set Marker key 8
signal quality
  indicator 7
Silence key 7
SmartKeys 7, 8
$SpO_2$
  active alarm source 10
  tone modulation 10
status indicator
  Avalon CTS 7
  recorder 7

## T

Timer SmartKey 8
Toco
  testing a transducer 7
Toco Baseline key 8
transducer
  finder LED 3
  testing 4, 7
    Toco 7
    ultrasound 4

## U

ultrasound
  testing a transducer 4
user default
  SmartKey 8

## V

volume
  indicator for alarm 6
  indicator for FHR 6